McCoy, Erin

From: Jackson, Hylton [DNR] <Hylton.Jackson@dnr.iowa.gov>
Sent: Tuesday, November 08, 2016 1:02 PM
To: 'Kinsey, Katie'
Cc: Davidson, Amie [DNR]; McCoy, Erin
Subject: RE: DICO Site
Attachments: removed.txt; OU-3-NorthPlume-2015.pdf; OU-3_DICO Site_RE.pdf

Katie,
Since there is a project planned for the north end of the DICO site (OU-3) I finally put together a short, updated report (see attached OU-3 NorthPlume pdf) on the groundwater sampling that the Department conducted a year ago. Of the seven monitoring wells sampled, only one –NW-36, showed a concentration of chlorinated solvents; Cis-1,2-DCE at 9 ug/L which was above the detection limit of 5 ug/L. The static water levels were just a little shallower than average but there were none noted less than 13.49 feet below the top of casing. (NW-31 and NW-32 have a 2-foot vertical stickup and everything else is flush-mount.) I have also attached an email thread between me and Erin McCoy at EPA (see OU-3_DICO). As we have discussed so far, some soil sampling and maybe a couple of groundwater samples would be appropriate to address some of the concerns associated at the site. I would certainly think that three or four soil samples taken north of the river would not be excessive. I would suggest advancing them to depths of at least 5 feet below the anticipated depth of the sewer pipe. I would like to see at least one groundwater sample collected from north of the river. We should also collect a couple of soil samples south of the river. Analytical parameters should address the concerns raised in the 1992 RI (namely VOCs and arsenic). The results will demonstrate the level of concern for human health (probably low) and what kind of solid waste issues the excavated soil may present. Call if you have any questions. I am asking for DMWW to present a work plan for the proposed sampling. Get in touch with me if we need to discuss any details before you prepare the work plan. Please keep in mind that I am only addressing the concerns of Iowa DNR as they relate to OU-3, the North Plume. Since the path of the proposed sewer line "splits" the OU-3 area and the DICO Superfund site, EPA may have comments or concerns relating to the DICO site.

HYLTON JACKSON Environmental Specialist
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Leading Iowans in Caring for Our Natural Resources.

From: Kinsey, Katie [mailto:kinsey@dmww.com]
Sent: Tuesday, November 01, 2016 3:31 PM
To: Jackson, Hylton [DNR]
Subject: DICO Site

Hylton,

DMWW has some nitrate waste that needs to travel from the Fleur Drive Water Treatment Plant north and east across the Raccoon River to a sanitary sewer that will eventually get to the WRA. A proposed alignment for this waste line goes through the DCE plume for the DICO site located just east of the Fleur Drive Water Treatment Plant. I am curious what restrictions DMWW has when designing or installing this line. I have attached the Fifth Five Year Review Report to this email. I have extracted plume maps from this report as the second attachment. On the first page of the second attachment, I have roughly drawn in the proposed alignment of this waste line in blue.

30292823

This waste line will be 12" in diameter and will be constructed using open cut methods, except when it will be installed under the Raccoon River. I am proposing to directionally drill the waste line under the River. Through the plume, I anticipate the waste line will be approximately 5 to 10 feet deep. It may be deeper under the banks of the River. Can you please help me learn what restrictions DMWW has for this line? I am curious about what materials I can use and also, what are we required to do with the soils that are disturbed because of the open cut methods.

Thank you,

KATIE KINSEY, P.E. | Professional Engineer
Des Moines Water Works | WATER YOU CAN TRUST FOR LIFE
2201 George Flagg Parkway | Des Moines, Iowa 50321 | www.dmww.com
phone: (515) 283-8796 | fax: (515) 283-2610 | e-mail: kinsey@dmww.com

From: Jackson, Hylton [DNR]
To: "McCoy, Erin"; Davidson, Amie [DNR]
Cc: Pemberton, Scott; Juett, Lynn
Subject: RE: DICO Site
Date: Thursday, November 03, 2016 10:04:00 AM

With some conditions, I plan on approving the installation of the 12" waste line (sanitary sewer). DMWW will be advised of the concerns raised in the 1992 RI and be asked to do some pre-construction soil and groundwater sampling. We will put them in touch with IDNR's Solid Waste Section so that they will have a Department contact for any solid waste issues that may arise.

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From: McCoy, Erin [mailto:McCoy.Erin@epa.gov]
Sent: Wednesday, November 02, 2016 1:33 PM
To: Jackson, Hylton [DNR]
Cc: Pemberton, Scott; Juett, Lynn
Subject: RE: DICO Site

Hylton, looking at this, OU3 has been turned over to the state of Iowa to manage. However, if the state would like EPA to assist, we can. I would recommend reviewing the 1992 Remedial Investigation for OU3. A baseline risk assessment was performed during this RI.

The summary of the risk assessment said (page 6-19, last paragraph):

Assuming a future construction or maintenance worker is exposed to the contaminated subsurface soil, the excess cancer risks could be as much as 2 x 10"6. The exposure assumptions in the risk assessment for the adult worker scenario are RME assumptions that combine the upperbound and mid-range exposure factors. These risk results were calculated using numerous assumptions and uncertainties that may result in an underestimation or an overestimation of the actual risks. Due to the assumption that the worker would breathe all of the calculated concentration of contaminant in air (i.e., no dilution, movement, or flow), and ingestion slope factors and RfDs are used because inhalation carcinogenic slope factors and RfDs are not readily available for some chemicals, the resulting risk of 2 x 10"6 may be an overestimation. The actual risk may be orders of magnitude less.

Page 7-4 states: Based on subsurface soil boring and soil gas data, this OU exhibits concentrations of contaminants that could pose a potential health risk to future workers involved in construction or maintenance activities. Estimated excess cancer risks could be as high as 2 x 10"6 via inhalation and 3 x 10"7 via incidental soil ingestion. These estimates assume a 30 m3/day inhalation rate, 0.05 g/day soil ingestion rate, respectively, over a 30-year period for 14 days per year. Major contributors are arsenic (ingestion) and PCE (inhalation). The hazard index did not exceed one. The estimated risk and hazard index results were derived using numerous assumptions, as well as the incertainty that may result in an overestimate of the actual risks.

Hopefully this will help. If not, and IDNR would like more assistance from EPA, please let me know. Thanks!

Erin McCoy, P.G. | Remedial Project Manager
EPA Region 7 | Superfund Division | Superfund Remediation Branch
11201 Renner Blvd | Lenexa, KS 66219
Phone: 913.551.7977
mccoy.erin@epa.gov | www.epa.gov

From: Jackson, Hylton [DNR] [mailto:Hylton.Jackson@dnr.iowa.gov]
Sent: Wednesday, November 02, 2016 1:13 PM
To: McCoy, Erin <McCoy.Erin@epa.gov>
Subject: FW: DICO Site

Erin ,
Received this email after I spoke to Ms Kinsey on the phone yesterday afternoon. Judging by the alignment of the proposed sewer line (on the LAST page of the second attachment) the pipe comes fairly close to the elevated cis-1,2-DCE concentrations associated with the North Plume – OU-3. I ran a concentration of 500 ug/L cis-1,2-DCE through the Johnson-Ettinger intermediate page (https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/JnE_lite_forward.html) to get an approximation of what a VI number could be and then ran that value through Iowa DNR's Cumulative Risk Calculator. The risk to Site Resident seems to comfortably screen out. The project would have other state regulations to comply with. If contaminated soil is excavated during the project it would have to be treated as solid/hazardous waste, depending on contaminant and concentration, and properly managed. I am going to wait for EPA's take on this.

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From: Kinsey, Katie [mailto:kinsey@dmww.com]
Sent: Tuesday, November 01, 2016 3:31 PM
To: Jackson, Hylton [DNR]
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This waste line will be 12" in diameter and will be constructed using open cut methods, except when it will be installed under the Raccoon River. I am proposing to directionally drill the waste line under the River. Through the plume, I anticipate the waste line will be approximately 5 to 10 feet deep. It may be deeper under the banks of the River. Can you please help me learn what restrictions DMWW has for this line? I am curious about what

materials I can use and also, what are we required to do with the soils that are disturbed because of the open cut methods.

Thank you,

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Please consider the environment before printing this e-mail.

TECHNICAL PROGRESS REPORT
on
GROUNDWATER MONITORING

Conducted

November 3 & 4, 2015,

for the

DES MOINES NORTH PLUME SITE

(OU-3)

Prepared by
the Iowa Department of Natural Resources
Contaminated Sites Section

TECHNICAL PROGRESS REPORT APRIL 2015 GROUNDWATER SAMPLING DES MOINES TCE OPERABLE UNIT No. 3 (NORTH PLUME) SITE

1. INTRODUCTION

Sampling of groundwater was conducted on November 3 & 4, 2015 in general accordance with the February 17, 1993, **Field Sampling Plan, Des Moines TCE OU No. 3, Des Moines, Iowa**, prepared by CH2M Hill and the Superfund State Contract between the Iowa Department of Natural Resources (DNR) and the U.S. Environmental Protection Agency (EPA) for the Des Moines TCE Site, Operable Unit 3. Five monitoring wells were sampled on November 3, 2015 and two on November 4, 2015. Samples were analyzed for volatile organic compounds (VOCs): Sampling locations are shown on the attached map.

2. PROCEDURES

The depth to water in each well was measured to the nearest 0. 1 ft. with a water level indicator Total well depth was also measured. Based on the depth to water, measured well depth, and well diameter, the volume of water in each well was calculated. This value was considered to represent one purge volume. The volume in the filter pack around the well screen was not included in the purge volume as recommended in the Field Sampling Plan.

A 12-volt submersible pump was utilized to purge all of the monitoring wells. Water was pumped into a 5-gallon bucket and dumped on the ground away from the well. Temperature, pH, and conductivity were recorded after each 5-gallons were purged. When these parameters stabilized within 10%, the sample was collected at each at each well.

Samples were collected immediately after purging. Samples were collected in three 40-ml vials at each monitoring well. The vials contained hydrochloric acid for sample preservation. Samples were collected directly from the pump used for purging. No headspace was allowed in the samples. Sample location and time were recorded on the sample containers, field book, and laboratory sample sheets. All samples were placed in an ice chest after collection. Samples were submitted to the State Hygienic Laboratory with chain-of-custody documentation.

3. RESULTS

Table 1 summarizes water-level information since the DNR initiated the sampling program in April 1996. Groundwater levels were typical of other years.

Table 2 is a cumulative summary of contaminant detections in the 8 (currently 7) monitoring wells which are part of the ongoing monitoring program. The recent results are consistent with past monitoring results. Quantifiable levels of contaminants were found in only 1 of the 7 monitoring wells sampled in November of 2015. NW-36 showed the only reportable contaminant concentration (DCE at 9 ug/L).

4. CONCLUSIONS AND RECOMMENDATIONS

The November 2015 sampling of Des Moines TCE OU3 monitoring wells yielded results generally comparable to previous sampling events. Overall there continues to be no evidence of significant changes and only low levels of contaminants have been detected. In conclusion, the results from the recent OU 3 groundwater sampling again provide no evidence of significant contamination from the North Plume migrating to the south/southwest towards the Des Moines Water Works' gallery system.

The IDNR recommends re-evaluation of the monitoring program for OU-3. Ceasing the monitoring program or reducing the monitoring frequency to be concurrent with Superfund five-year reviews are options that should considered.

TABLE 1: WATER LEVEL MEASUREMENTS

Depth to Water (in feet) Before Sampling

	NW-30	NW-31	NW-32	NW-34	NW-35	NW-36	NW-39	NW-40
4-22-96	15.74	22.21	23.42	42.25	Dry	22.96	41.80	23.20
10-21-96	15.60	22.21	23.00	41.24	17.48	20.68	39.64	20.82
5-20-97	12.07	19.17	20.09	38.63	17.52	20.59	37.48	21.04
11-20-97	16.62	22.40	23.31	41.58	17.43	20.71	--	20.90
5-26-98	9.47	17.26	18.74	38.82	16.82	20.03	--	20.36
5-14-99	8.98	17.25	18.28	38.01	17.92	21.00	--	20.60
4-28-00	16.26	22.99	24.11	42.20	19.86	22.92	--	22.85
7-26-01	15.20	21.74	22.36	40.24	17.78	20.90	--	20.30
9-11-02	15.6	22.4	23.2	41.55	18.4	21.6	--	21.5
11-22-04	--	21.9	22.52	40.6	18.2	21.4	--	21.2
10-14-05	16.55	22.3	22.9	40.85	18.25	21.23	--	24.8
9-19-07	13.84	19.84	20.41	38.16	15.97	19.13	--	18.85
9-23-09	15.63	21.61	22.11	39.88	17.1	20.3	--	20.4
5-23/30-12	14.5	21.3	22.1	40.7	17.5	20.8	--	21.0
9-3/4-15	13.49	19.49	20.21	38.37	15.05	19.32		19.13

TABLE 2: CUMULATIVE SUMMARY OF CONTAMINANT LEVELS (µg/l) IN DES MOINES TCE OU3 MONITORING WELLS

Sample Date	Para-meter	NW-30	NW-31	NW-32	NW-34	NW-35	NW-36	NW-39	NW-40
July 1989	PCE	ND	ND	ND	4J	170	8J	--	--
	TCE	ND	ND	ND	1J	54J	2J	--	--
	DCE	ND	ND	ND	ND	24J	0.8J	--	--
Aug. 1989	PCE	0.7J	ND	ND	4	94	2	--	--
	TCE	ND	ND	ND	1	32	ND	--	--
	DCE	ND	ND	ND	ND	17	ND	--	--
Sept. 1989	PCE	ND	ND	ND	3J	138J	ND	--	--
	TCE	ND	ND	ND	ND	29J	ND	--	--
	DCE	ND	ND	ND	ND	14J	ND	--	--
Oct. 1989	PCE	ND	ND	ND	2	150J	ND	--	--
	TCE	ND	ND	ND	ND	42	ND	--	--
	DCE	ND	ND	ND	ND	22	ND	--	--
Jan. 1990	PCE	ND	ND	ND	3	350	0.7J	--	--
	TCE	ND	ND	ND	0.7J	100	ND	--	--
	DCE	ND	ND	ND	ND	48	ND	--	--
March 1990	PCE	ND	ND	ND	2	330	ND	--	--
	TCE	ND	ND	ND	ND	90	ND	--	--
	DCE	ND	ND	ND	ND	59	ND	--	--
April 1990	PCE	ND	ND	ND	2	185	1	--	--
	TCE	ND	ND	ND	ND	44	ND	--	--
	DCE	ND	ND	ND	ND	28.5	ND	--	--
Sept. 1990	PCE	ND	ND	ND	ND	335	ND	--	--
	TCE	ND	ND	ND	ND	88.5	ND	--	--
	DCE	ND	ND	ND	ND	54J	ND	--	--
Dec. 1990	PCE	ND	ND	ND	2	315	ND	--	--
	TCE	ND	ND	ND	ND	82.5	ND	--	--
	DCE	ND	ND	ND	ND	44.5	ND	--	--
June 1991	PCE	ND	ND	ND	ND	97.5	ND	3.2	5.4
	TCE	ND	ND	ND	ND	22	ND	5.1	2.6
	TCE	ND	ND	ND	ND	11	ND	20	7.7
Sept. 1991	PCE	ND	ND	ND	1.7	21J	ND	4.2J	1.1
	TCE	ND	ND	ND	ND	23J	ND	3.8J	ND
	DCE	ND	ND	ND	ND	14	ND	ND	3.0

TABLE 2 (Cont.): CUMULATIVE SUMMARY OF CONTAMINANT LEVELS (µg/l) IN DES MOINES TCE OU3 MONITORING WELLS

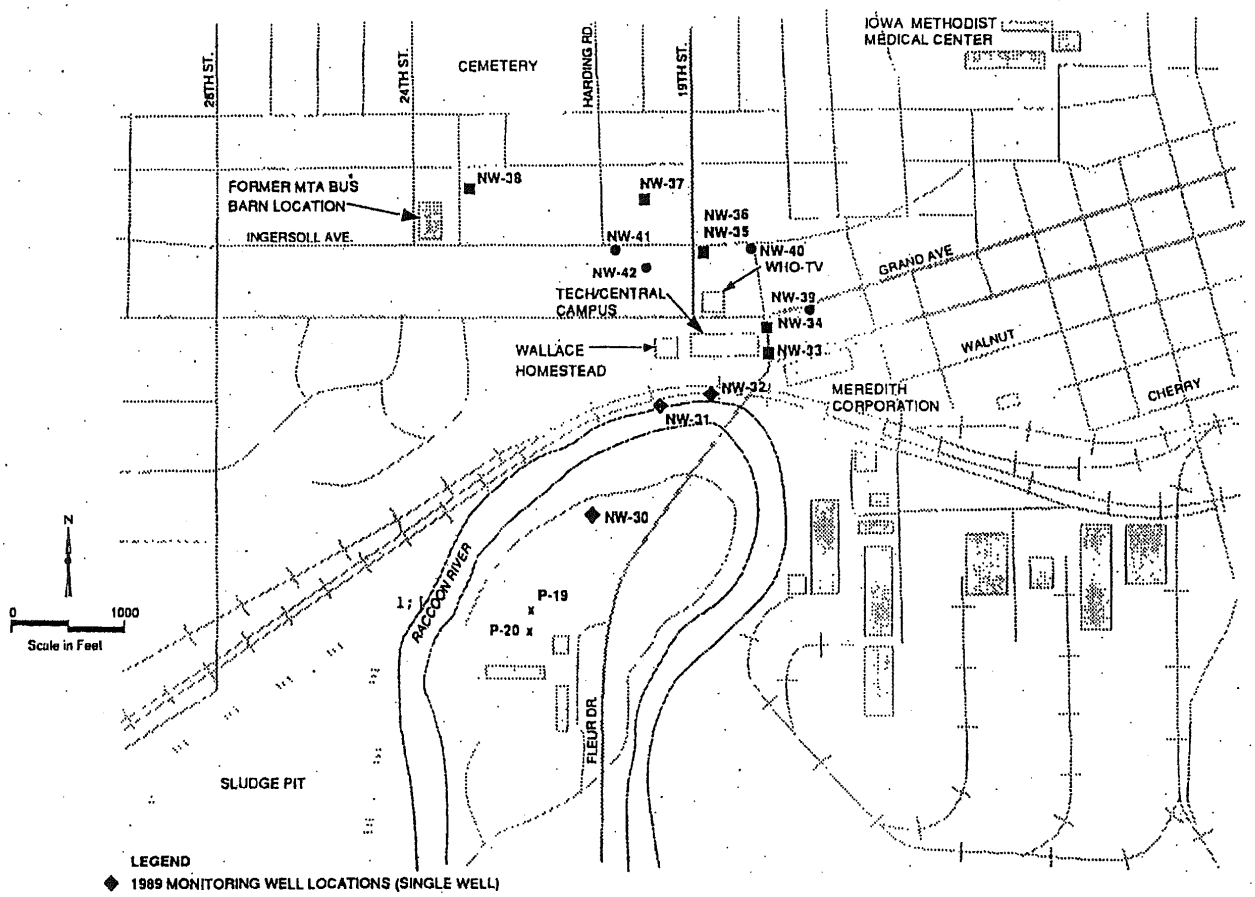
Sample Date	Para-meter	NW-30	NW-31	NW-32	NW-34	NW-35	NW-36	NW-39	NW-40
Apr. 1996	PCE*	ND	ND	ND	ND	--	ND	7	ND
	TCE*	ND	ND	ND	ND	--	ND	ND	ND
	DCE*	ND	ND	ND	ND	--	ND	ND	ND
	VC*	ND	ND	ND	ND	--	ND	ND	ND
Oct. 1996	PCE*	ND	ND	ND	ND	44	ND	5 (7)	17
	TCE*	ND	ND	ND	ND	16	ND	4J (5J)	ND
	DCE*	ND	ND	ND	ND	5J	ND	ND(ND)	ND
	VC	ND	ND	ND	ND	ND	ND	ND(ND)	ND
May 1997	PCE	ND	ND	ND	ND	22 (16)	ND	6	ND
	TCE	ND	ND	ND	ND	10 (8)	ND	4	ND
	DCE	ND	ND	ND	ND	4 (3)	ND	ND	ND
	VC	ND	ND	ND	ND	ND(ND)	ND	ND	ND
Nov. 1997	PCE	ND	ND	ND	ND	26	ND	--	2 (2)
	TCE	ND	ND	ND	ND	8	ND	--	ND(ND)
	DCE	ND	ND	ND	ND	3	ND	--	1 (1)
	VC	ND	ND	ND	ND	ND	ND	--	1 (1)
May 1998	PCE	ND	ND	ND	ND	31	ND	--	3
	TCE	ND	ND	ND	ND	8	ND	--	ND
	DCE	ND	ND	ND	ND	3	ND	--	2
	VC	ND	ND	ND	ND	ND	ND	--	ND
May 1999	PCE	ND	ND	ND	ND	140(130	ND	--	1
	TCE	ND	ND	ND	ND	36 (40)	1	--	ND
	DCE	ND	ND	ND	ND	20 (21)	2	--	ND
	VC	ND	ND	ND	ND	ND(ND)	ND	--	ND
April 2000	PCE*	ND	ND	ND	ND	67	ND	--	ND(ND)
	TCE*	ND	ND	ND	ND	42	ND	--	ND(ND)
	DCE*	ND	ND	ND	ND	18	ND	--	ND(ND)
	VC*	ND	ND	ND	ND	ND	ND	--	ND(ND)
July 2001	PCE	ND	ND	ND	ND	170(120	ND	--	2
	TCE	ND	ND	ND	ND	65 (63)	3	--	ND
	DCE	ND	ND	ND	ND	28 (25)	5	--	ND
	VC	ND	ND	ND	ND	ND(ND)	ND	--	ND
Sept. 2002	PCE	ND	ND	ND	ND	130(130	ND	--	ND
	TCE	ND	ND	ND	ND	40 (41)	4	--	ND
	DCE	ND	ND	ND	ND	18 (18)	10	--	ND

NOTES: ND = Not detected at detection limit.
* Detection limit = 5 µg/l
J = The associated value is an estimate
-- = Indicates no sample was collected.

TABLE 2 (Cont.): CUMULATIVE SUMMARY OF CONTAMINANT LEVELS (µg/l) IN DES MOINES TCE OU3 MONITORING WELLS

Sample Date	Para-meter	NW-30	NW-31	NW-32	NW-34	NW-35	NW-36	NW-39	NW-40
Nov. 2004	PCE	--	<0.5	<0.5	<0.5 (J)	21 (22)	1.5	--	<0.5 (J)
	TCE	--	<0.5	<0.5	<0.5 (J)	9.9 (11)	18	--	<0.5 (J)
	DCE	--	<0.5	<0.5	<0.5	3.0(3.3)	20	--	<0.5 (J)
	VC	--	<0.5	<0.5	<0.5	<0.5	<0.5 (J)	--	<0.5
Oct. 2005	PCE*	<5	<5	<5	<5	22 (20)	<5	--	<5
	TCE*	<5	<5	<5	<5	13 (10)	<5	--	<5
	DCE*	<5	<5	<5	<5	<5 (<5)	<5	--	<5
	VC*	<5	<5	<5	<5	<5 (<5)	<5	--	<5
Sept. 2007	PCE	<0.5	<0.5	<0.5	0.7	25 (23)	<0.5	--	<0.5 (J)
	TCE	<0.5	<0.5	<0.5	<0.5 (J)	7.3 (7.4)	1.9	--	<0.5
	DCE	<0.5	<0.5	<0.5	<0.5	2.1(2.1)	4.2	--	<0.5
	VC	<0.5	<0.5	<0.5	<0.5	<.5(<.5)	<0.5 (J)	--	<0.5
Dec. 2008	PCE	--	--	--	3.2	--	--	--	--
	TCE	--	--	--	2.1	--	--	--	--
	DCE	--	--	--	0.8	--	--	--	--
	VC	--	--	--	<0.5	--	--	--	--
Sept. 2009	PCE	<5	<5	<5	<5	17	<5	--	<5
	TCE	<5	<5	<5	<5	9	<5	--	<5
	DCE	<5	<5	<5	<5	<5	7	--	<5
	VC	<5	<5	<5	<5	<5	<5	--	<5
May 2012	PCE	<0.5	<0.5	<0.5	4.4	5.1	<0.5	--	<0.5
	TCE	<0.5	<0.5	<0.5	2.2	4.8	1.7	--	<0.5
	DCE	<0.5	<0.5	<0.5	<0.5	1.3	5.1	--	<0.5
	VC	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5
Nov. 2015	PCE	<5	<5	<5	<5	<5	<5	--	<5
	TCE	<5	<5	<5	<5	<5	<5	--	<5
	DCE	<5	<5	<5	<5	<5	9	--	<5
	VC	<5	<5	<5	<5	<5	<5	--	<5

NOTES: ND = Not detected at detection limit.
* Detection limit = 5 µg/l
J = Compound detected below quantification limit.
-- = Indicates no sample was collected.



LEGEND

- ◆ 1989 MONITORING WELL LOCATIONS (SINGLE WELL)
- ■ 1989 MONITORING WELL LOCATION (2 WELLS)
- X 1989 PIEZOMETER LOCATION
- ● 1991 MONITORING WELL LOCATIONS (SINGLE WELL)

NOTE: MONITORING WELL & PIEZOMETER LOCATIONS ARE APPROXIMATE

MONITORING WELL AND PIEZOMETER LOCATIONS
DES MOINES TCE
OU NO. 3 RI/FS

APPENDIX A

LABORATORY RESULTS

November 3 & 4, 2015

State Hygienic Laboratory

The University of Iowa

Accession Number	314664
Date Sample Finalized	2015-11-10 12:27
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-04 14:15
Collection Site	nw-35
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 15:40	Date Verified	2015-11-10 12:27
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

Michael D. Wichman, Ph.D.
Wade K. Aldous, Ph.D (D)ABMM
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Ankeny, IA 50023
515/725-1600 Fax: 515/725-1642

State Hygienic Laboratory

The University of Iowa

Accession Number | 314664

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

Iowa Environmental Laboratory IDs are: Ankeny #397, Iowa City/Coralville #027, Lakeside #393.

If you have any questions, please call Client Services at 800/421-IOWA (4692) or 319/335-4500. Thank you.

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State Hygienic Laboratory

The University of Iowa

Accession Number	314663
Date Sample Finalized	2015-11-10 12:27
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-03 15:00
Collection Site	nw-36
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 13:55	Date Verified	2015-11-10 12:27
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	9	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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State Hygienic Laboratory

The University of Iowa

Accession Number | 314663

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	9	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

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State Hygienic Laboratory

The University of Iowa

Accession Number	314660
Date Sample Finalized	2015-11-10 12:26
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-03 12:30
Collection Site	nw-30
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 12:36	Date Verified	2015-11-10 12:26
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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State Hygienic Laboratory

The University of Iowa

Accession Number | 314660

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

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State Hygienic Laboratory

The University of Iowa

Accession Number	314659
Date Sample Finalized	2015-11-10 12:25
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-03 11:45
Collection Site	nw-31
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 12:10	Date Verified	2015-11-10 12:25
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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State Hygienic Laboratory

The University of Iowa

Accession Number | 314659

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

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State Hygienic Laboratory

The University of Iowa

Accession Number	314658
Date Sample Finalized	2015-11-10 12:25
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-03 10:45
Collection Site	nw-32
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 11:44	Date Verified	2015-11-10 12:25
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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State Hygienic Laboratory

The University of Iowa

Accession Number | 314658

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

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State Hygienic Laboratory

The University of Iowa

Accession Number	314661
Date Sample Finalized	2015-11-10 12:26
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-03 13:30
Collection Site	nw-34
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 13:02	Date Verified	2015-11-10 12:26
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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State Hygienic Laboratory

The University of Iowa

Accession Number | 314661

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

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State Hygienic Laboratory

The University of Iowa

Accession Number	314662
Date Sample Finalized	2015-11-10 12:26
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-03 13:45
Collection Site	nw-34 duplicate
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 13:28	Date Verified	2015-11-10 12:26
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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State Hygienic Laboratory

The University of Iowa

Accession Number | 314662

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

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State Hygienic Laboratory

The University of Iowa

Accession Number	314665
Date Sample Finalized	2015-11-10 12:28
Date Received	2015-11-05 15:04
Sample Source	Non-Drinking Water
Project	WMSF
Date Collected	2015-11-04 15:00
Collection Site	nw-40
Collection Address	
	DES MOINES, IA
Sample Description	ground water
Client Reference	dsm north plume
Collector	jackson hylton
Phone	515/725-8338

HYLTON JACKSON
IDNR CONTAMINATED SITES
LAND QUALITY BUREAU
502 E 9TH STREET
DES MOINES, IA 50319-0034

Note: Upon arrival, sample met container and preservation requirements for the analysis requested. Please review carefully your sample results for additional analyte comments or method exceptions.

Results of Analyses

GCMS Volatiles, EPA 8260

Units	ug/L	Analyzed In	Coralville
Date Analyzed	2015-11-09 14:47	Date Verified	2015-11-10 12:28
Analyst	LJL	Verifier	TGC

Analyte	Result	Quant Limit
Chloromethane	<5	5
Bromomethane	<5	5
Vinyl chloride	<5	5
Chloroethane	<5	5
Methylene chloride	<5	5
Methyl-t-butyl ether (MtBE)	<5	5
Acetone	<5	5
Carbon disulfide	<5	5
1,1-Dichloroethene	<5	5
1,1-Dichloroethane	<5	5
Total 1,2-Dichloroethenes	<5	5
Chloroform	<5	5
1,2-Dichloroethane	<5	5
2-Butanone	<5	5
1,1,1-Trichloroethane	<5	5
Carbon tetrachloride	<5	5
Bromodichloromethane	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
Trichloroethene	<5	5
Dibromochloromethane	<5	5
1,1,2-Trichloroethane	<5	5
Benzene	<5	5
trans-1,3-Dichloropropene	<5	5
Bromoform	<5	5

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Ankeny, IA 50023
515/725-1600 Fax: 515/725-1642

State Hygienic Laboratory

The University of Iowa

Accession Number | 314665

Analyte	Result	Quant Limit
4-Methyl-2-pentanone	<5	5
2-Hexanone	<5	5
Tetrachloroethene	<5	5
1,1,2,2-Tetrachloroethane	<5	5
Toluene	<5	5
Chlorobenzene	<5	5
Ethylbenzene	<5	5
Styrene	<5	5
Total Xylenes	<5	5
cis-1,2-Dichloroethylene	<5	5
trans-1,2-Dichloroethylene	<5	5

Description of Units used within this report

ug/L = Micrograms per Liter

The result(s) of this report relate only to the items analyzed. This report shall not be reproduced except in full without the written approval of the laboratory.

Iowa Environmental Laboratory IDs are: Ankeny #397, Iowa City/Coralville #027, Lakeside #393.

If you have any questions, please call Client Services at 800/421-IOWA (4692) or 319/335-4500. Thank you.

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APPENDIX B

FIELD NOTES

Des Moines North Plume
11/3/2015 - 7537 - 2824

NW 32 SWL 20.21 btoc

@ gal	Ph	Temp	cond
5	6.15	59.7 ~~59.2~~	~~1785~~
10	6.38	58.4	755
15	6.58	58.2	746
25	6.68	58.5	~~687~~
30	6.71	58.3	700
3	40 ml	@	10:45

NW-31 SWL 19.49 btoc

@ gal	ph	temp	cond
10	6.53	62.9	724
20	6.60	65.3	635
30	6.58	60.7	653
3	40 ml	@	11:45

NW-30 SWL 13.40 btoc

@ gal	ph	temp	cond
10	6.64	68.1	534
20	6.77	65.8	540
30	7.01	66.8	552
3	40 ml	@	12:30

2 Des Moines N Plume

NW-34 SWL 39.37 btoc

@ gal	ph	temp	cond
10	6.41	65.4	1710
20	6.62	62.6	1790
30	6.71	62.5	1750
40	6.74	62.7	1770
50	6.76	63.0	1745
3	40 ml	@	1:30
3	40 ml	@	1:45 Dup

NW-36 west well SWL 19.22 btoc 57' deep

@ gal	ph	temp	cond
15	7.05	64	1540
25	7.12	62.5	1534
35	7.07	63.0	1513
3	40 ml	@	3:00 pm

Des Moines N Plume 11/4/2015

NW-35 East well SWL 15.05? btoc

@ gal	ph	temp	cond
5	7.17	64.4	2466
10	6.90	64.2	2585
15	7.01	63.8	2572
3	40 ml	@	2:25 pm

11/4/2015

Des Moines North Plume

NW-40 SWL 19.13' 64oc

@gal	ph	Temp	cond
5	7.05	64.3	3235
10	7.00	64.0	3050
15	6.86	62.9	3020
20	6.70	62.7	2938

3 40 ml @ 3:00 p.m.